

## **PNEUMATIC DENT PULLER**

### **FIELD OF THE INVENTION**

The present invention relates to dent pullers for repairing damaged metal panels and parts of automotive vehicles, and more particularly pertains to a pneumatic dent puller with an integrally attached screw for repairing such damaged metal panels and parts.

### **BACKGROUND OF THE INVENTION**

Various types of tools and equipment have been heretofore conceived for pulling out and straightening dents in the metal panels and parts of automotive vehicles that can include everything from exterior side panels and radiator supports to boxed areas and enclosures. Such devices have included devices that are mechanically connected to the dented area of the vehicle, and devices that employ electromagnets for pulling and straightening the dented or deformed area of the vehicle. The general procedure is first make a hole in the center of the dented area, such as a vehicle body panel or door, and then insert a tool, appliance or attachment into the hole. The appliance is secured to a rod, and the rod is retracted or reciprocated by a hammer or mallet, thereupon retracting the appliance and causing the dented part to return to its original position. In addition, pulling devices can support other attachments including harmonic balancer puller and bearing pullers.

One common dent puller device is a slide hammer, and auto body mechanics use the slide hammer for pulling bearings as well as for dent repair. The slide hammer includes a weight or slide mounted on a body section or rod. The slide reciprocates on the rod in conjunction with the mechanic pulling on the slide hammer to pull and repair

the dent. However, the technician must exert a large amount of physical energy during the dent pulling operation. In addition, there is a considerable amount of vibration in the operation of a traditional slide hammer due to the reciprocating, slapping action of the slide, and this continuous vibration causes discomforting strain on the hands and arms of the technician. Furthermore, skinned knuckles and bruises are common during the operation of the slide hammer because the technician's fingers are often caught in the wrong place when pulling dents from automotive panels and parts.

Therefore, the prior art reveals a wide range of dent pulling devices. For example, the Curington patent (U.S. patent 3,958,645) discloses a bore hole air hammer in which a percussive action is imparted to a drill bit during rotation thereof, and the internal structure of the housing chamber is designed to minimize the binding tendency of the piston by minimizing the contact of the piston with the ends of the housing.

The Malarsky patent (U.S. patent 4,116,035) discloses a dent puller wherein a dent puller rod is mounted to a u-shaped bracket having pivotally adjustable legs with the legs mountable against the surface material for positioning the rod for the dent pulling operation.

The Dibbens patent (U.S. patent 4,252,008) discloses a wheeled electromagnetic dent pulling device wherein an electromagnetic is attached to a boom pivotally mounted to a stanchion, and the stanchion is attached to the wheeled housing.

The Ishihara patent (U.S. patent 5,333,486) discloses a sheet metal drawing equipment wherein a bit is welded to the sheet metal to be drawn, and the bit is supported by legs and cushioned by annular cushion members during the drawing action.

The McCain et al. patent (U.S. patent 5,408,861) discloses a pneumatic puller wherein a pair of weights are externally mounted to a shaft and violently pulled backward to effect the dent pulling operation by pulling rearward a self tapping member connected to the material to be pulled.

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### **SUMMARY OF THE INVENTION**

The present invention comprehends a pneumatic dent puller that operates similar to a traditional slide hammer, but includes an integral pneumatic hammer in place of the common slide weight of traditional slide hammers. The pneumatic dent puller includes a handle having a trigger with an air hose fitting for interconnection to an air hose that  
10 delivers pressurized air to the pneumatic hammer, and a housing containing the elements that regulate and direct the airflow therein. The forward end of the housing terminates with a threaded member that is inserted into a hole formed in the center of the dented panel or structure, and the technician simultaneously actuates the trigger while applying pressure to the handle thereby causing the dented part to be pulled back to its original  
15 position.

It is an objective of the present invention to provide a pneumatic dent puller that increases the productivity of the technician by decreasing the time needed for the specific dent pulling operation.

It is another objective of the present invention to provide a pneumatic dent puller  
20 that alleviates and lessens the physical exertion required by the technician during the dent pulling operation.

It is yet another objective of the present invention to provide a pneumatic dent puller that decreases the likelihood of injury to the technician's fingers and hands during the dent pulling operation.

These and other objects, features and advantages will become apparent to one skilled in the art upon a perusal of the following detailed description read in conjunction with the following drawing figures.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a perspective view of the pneumatic dent puller of the present invention;

Figure 2a is a side elevational view of the pneumatic dent puller illustrating the insertion of the threaded member into the sheet material;

Figure 2b is side elevational view of the pneumatic dent puller illustrating the attachment of a u-shaped tool to the housing of the dent puller for pulling boxed areas or enclosures;

Figure 2c is a side elevational view of the pneumatic dent puller illustrating the attachment of right-angled shaped tool to the housing of the dent puller for pulling boxed areas or enclosures; and

Figure 3 is a perspective view of the housing of the pneumatic dent puller illustrating the incremental depth slider adjustment switch for setting the pull distance for each discrete pull effected by the pneumatic dent puller.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

Illustrated in figures 1 – 3 is a pneumatic dent puller 10 that operates like a traditional slide hammer, but utilizes a pneumatic hammer 12 instead of the slide weight

of the traditional slide hammer. The pneumatic dent puller 10 is used to pull dents from the panels and parts of automotive vehicle bodies, and the dent puller 10 of the present invention can also accommodate attachments for pulling and repairing such structures as radiator supports, boxed braces and areas, and panel edges as will be hereinafter further  
5 described.

As shown in figure 1, the pneumatic dent puller 10 includes the integral air hammer 12 (in place of the slide weight), and thus the dent puller 10 of the present invention is intended as a lightweight alternative to the traditional - and heavier - slide hammer. The pneumatic dent puller 10 includes a handle 14 having a manually operable  
10 trigger 16. Projecting from the bottom of the handle 16 is an air hose fitting 18 that connects to an air hose 20 for delivering pressurized air to the pneumatic hammer 12.

As shown in figures 1 - 3, the pneumatic dent puller 10 includes a generally cylindrical, elongated housing 22 for enclosing therein the pneumatic hammer 12, and the housing 22 terminates at a nose end 24. The pneumatic hammer 12 applies force in the  
15 direction opposite of the dent. The nose 24 includes an aperture 26 for receiving and securing therein a removably attachable threaded member 28 such as a threaded screw. The threaded member 28 should be replaceable as over time the threads will tend to get stripped from use, as well as the fact that the threaded member 28 can be broken. Figure 2a shows the insertion of the threaded member 28 into the dented surface portion 30 of a  
20 panel 32 of an automotive vehicle. The threaded member 28 has been inserted into a hole 34 in the dented portion 30 formed by the technician using a drill or scratch awl. The threaded member 28 is securely fastened to the dented portion 30 by being threaded

therein. The directional arrow shows the direction of the pulling force that is exerted by dent puller 10 during the pulling operation.

Figures 2b and 2c illustrate tools that are removably attachable to the dent puller 10 for pulling radiator supports, boxed areas, panel edges and other enclosures. Specifically, figure 2b illustrates a u-shaped tool 36 that partially encircles the structure 38 to be pulled, while figure 2c illustrates a right-angled tool 40 that hooks around a boxed structure 42. The u-shaped tool 36 includes a base portion 44, and the right-angled tool 40 includes a base portion 46. There are several ways the tools 36 and 40 can be attached to the nose 24 of the dent puller 10. In the embodiments of the tools 36 and 40 shown in figures 2b and 2c, each tool 36 and 40 includes a stud 48 integrally formed to the respective tool 36 and 40 at the base portion 44 and 46. Each tool 36 and 40 would be secured to the dent puller 10 by screwing the respective stud 48 into the aperture 26 at the nose 24 of the housing 22. In the alternative, the base portion 44 and 46 for each tool 36 and 40 would include a threaded aperture, and the threaded member 28 would be threadably inserted into the threaded aperture thereby securing the tools 36 and 40 to the dent puller 10.

In order to provide a more precise pulling action, the dent puller 10 of the present invention can include an incremental pull distance adjustment means that is selectively manually manipulable by the technician. More specifically, the incremental adjustment means includes a depth slider switch 50 mounted on the housing 22 as shown in figures 1 – 3. Setting the depth slider switch 50 at various increments, such as 1/8 inch, 1/4 inch, and 3/8 inch, would set the pull distance commensurate to the depth of the particular

dent. Thus each discrete pulling action by the dent puller 10 would be in the specific incremental distance as set by the slider switch 50.

In order to repair the dented portion 30 or panel of the automotive vehicle, the technician would first make the hole 34 in the center of the dented portion 30 with a drill  
5 or punch. The threaded member 28 of the dent puller 10 would then be threaded into the hole 34. The technician would then pull on the trigger 16 while at the same time applying a slight pulling force on the handle 14 of the dent puller 10. The action of the air hammer 12 within the housing 22 in the direction opposite of the end of the threaded member 28 thereby causes the dent to be pulled back to its original position. After the  
10 dent has been pulled, the threaded member 28 is removed from the hole 34; and further automotive body repair is done on the panel by grinding the paint from the dented area and finishing the exterior surface of the panel 32 or part with the desired body filler.

Although a preferred embodiment of the invention has been described, numerous modifications, alterations, and variations will become apparent to one skilled in the art,  
15 and it is not intended to limit the invention to the aforescribed details, but the appended claims are intended to cover all modifications, variations, and alterations that fall within the spirit and scope of the invention.